



Elena V. Shevchenko

Scientist, Center for Nanoscale Materials

Argonne National Laboratory,
9700 South Cass Avenue, Bldg 440,
A-126

Argonne, IL, 60439-4806

Phone: 630-252-7633

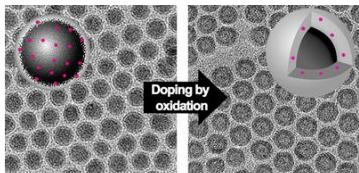
E-mail: eshevchenko@anl.gov

- Ph.D. - University of Hamburg, Germany, 2003

- Understanding the mechanism of nucleation and growth of nanomaterials.
 - Self-assembly of nanoparticles.
 - In-situ techniques to visualize the synthesis and study of structure-property correlation at nanoscale.
 - Nanomaterials for application in batteries and catalysis.

Selected publications from a total of 70+

Synthesis of nanomaterials



- 1.** Soon Gu Kwon, Soma Chattopadhyay, Bonil Koo, Paula Cecilia dos Santos Claro, Tomohiro Shibata, Félix G. Requejo, Lisandro J. Giovanetti, Yuzi Liu, Christopher Johnson, Vitali Prakapenka, Byeongdu Lee, **Elena V. Shevchenko**. Oxidation Induced Doping of Nanoparticles Revealed by In Situ X-Ray Adsorption Studies. *Nano Lett.*, **2016**, asap.

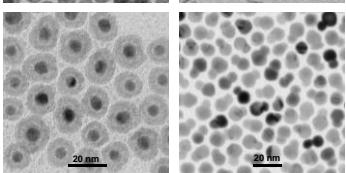
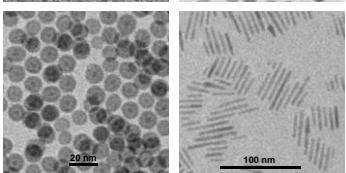
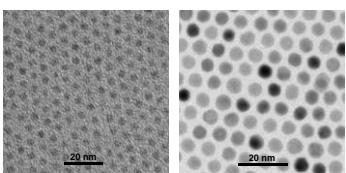
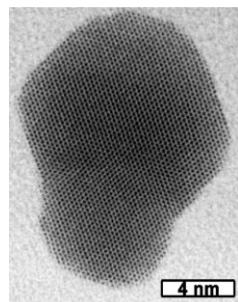
2. Soon Gu Kwon, Galyna Krylova, Patrick J. Phillips, Robert F. Klie, Soma Chattopadhyay, Tomohiro Shibata, Emilio E. Bunel, Yuzi Liu, Vitali B. Prakapenka, Byeongdu Lee, and **Elena V. Shevchenko**. Heterogeneous Nucleation and Shape Transformation of Multicomponent Metallic Nanostructures Studied by in situ Synchrotron X-Ray Scattering. *Nature Materials*, **2015**, *14*, 215-223.

3. Arnaud Demortière, Richard D. Schaller, Tao Li, Soma Chattopadhyay, Galyna Krylova, Tomohiro Shibata, Paula C. dos Santos Claro, Clare E. Rowland, Jeffrey T. Miller, Russell Cook, Byeongdu Lee, and **Elena V. Shevchenko**. In Situ Optical and Structural Studies on Photoluminescence Quenching in CdSe/CdS/Au Heterostructures. *J. Am. Chem. Soc.* **2014**, *136*, 2342-2350.

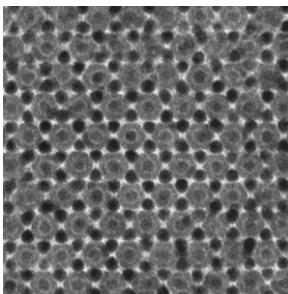
4. Galyna Krylova, Lisandro J. Giovanetti, Felix G Requejo, Nada M. Dimitrijevic, Alesia Prakapenka **Elena V. Shevchenko**. Study of Nucleation and Growth Mechanism of the Metallic Nanodumbbells. *J. Am. Chem. Soc.* **2012**, *134*, 4384-4392.

5. **E.V. Shevchenko**, M.I. Bodnarchuk, M.V. Kovalenko, D.V. Talapin, R.K. Smith, S. Aloni, W. Heiss, A.P. Alivisatos. Gold (Core) – Iron Oxide (Hollow Shell) Nanoparticles. *Adv. Mater.* **2008**, *20*, 4323-4329.

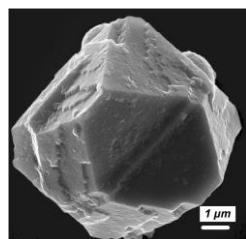
6. **E. Shevchenko**, D. Talapin, H. Schablegger, A. Kornowski, H.Weller. Study of Nucleation and Growth in the “hot” organometallic synthesis of magnetic alloy nanocrystals: the role of nucleation rate in size tuning of CoPt₃ nanocrystals. *J. Am. Chem. Soc.* **2003**, *125*, 9090-9101.



Self-assembly of nanoparticles

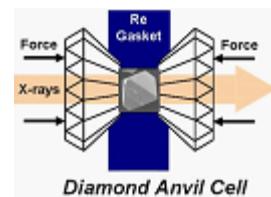


7. Maryna I. Bodnarchuk, **Elena V. Shevchenko**, and Dmitri V. Talapin. Structural Defects in Periodic and Quasicrystalline Binary Nanocrystal Superlattices. *J. Am. Chem. Soc.*, **2011**, 133 (51), 20837–20849.
8. P. Podsiadlo, B. Lee, V.B. Prakapenka, G.V. Krylova, R.D. Schaller, A. Demortiere, **E.V. Shevchenko**. High-pressure stability and elasticity of supercrystals self-assembled from nanocrystals. *Nano Lett.* **2011**, 11, 579–588.
9. B. Lee, P. Podsiadlo, S. Rupich, D.V. Talapin, T. Rajh, **E.V. Shevchenko**. Comparison of structural behavior of nanocrystals in randomly packed films and long-range ordered superlattices by time-resolved small angle X-Ray scattering. *J. Am. Chem. Soc.* **2009**, 131, 16386–16388
10. D.V. Talapin,* **E.V. Shevchenko**,* M.I. Bodnarchuk, J. Chen, X. Ye, C.B. Murray. Qasicrystalline order in self-assembled binary nanoparticle superlattices. *Nature*, **2009**, 461, 892–893. (*equal contribution).
11. **E.V. Shevchenko**, M. Ringler, A. Schwemer, D.V. Talapin, T.A. Klar, A.L. Rogach, J. Feldmann, A.P. Alivisatos. Self-Assembled Binary Superlattices of CdSe and Au Nanocrystals and Their Fluorescence Properties. *J. Am. Chem. Soc.* **2008**, 130, 3274–3275.
12. **E.V. Shevchenko**, J.B. Kortright, D.V. Talapin, S. Aloni, A.P. Alivisatos. Quasi-Ternary Nanoparticle Superlattices through nanoparticle design. *Adv. Mater.* **2007**, 19, 4183–4188.
13. **E.V. Shevchenko**, D.V. Talapin, C.B. Murray, S. O'Brien. Structural Characterization of Self-Assembled Multifunctional Binary Nanoparticle Superlattices. *J. Am. Chem. Soc.* **2006**, 128, 3620–3637.
14. **E. V. Shevchenko**, D. V. Talapin, N. A. Kotov, S. O'Brien, C. B. Murray. Structural Diversity in Binary Nanoparticle Superlattices. *Nature* **2006**, 439, 55–59.
15. D. Talapin, **E. Shevchenko**, A. Kornowski, S. Foerster and H. Weller. CdSe and CdSe/CdS Nanorod Solids. *J. Am. Chem. Soc.* **2004**, 126, 12984–12988.
16. **E. Shevchenko**, D. Talapin, A. Kornowski, F. Wiekhorst, J. Kötzler, M. Haase, A. Rogach, H. Weller. Colloidal Crystals of Monodisperse FePt Nanoparticles Grown by a Three-Layer Technique of Controlled Oversaturation. *Adv. Mater.* **2002**, 14, 287–289.

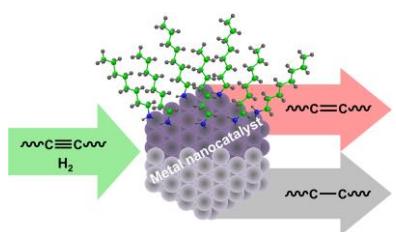


Mechanical properties of nanoparticles and their self-assembled structures

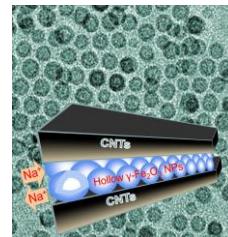
17. Podsiadlo, P.; Kwon, S.G.; Koo, B.; Lee, B.; Prakapenka, V.B.; Dera, P.; Zhuravlev, K.K.; Krylova, G.; Shevchenko, E.V. How "hollow" are hollow nanoparticles? *J. Am. Chem. Soc.* **2013**, 135, 2435–2438.
18. P. Podsiadlo, B. Lee, V.B. Prakapenka, G.V. Krylova, R.D. Schaller, A. Demortiere, E.V. Shevchenko. High-pressure stability and elasticity of supercrystals self-assembled from nanocrystals. *Nano Lett.* **2011**, 11, 579–588.
19. P. Podsiadlo, G. Krylova, B. Lee, K. Critchley, D. J. Gosztola, D. V. Talapin, P. D. Ashby, E. V. Shevchenko. The Role of Order, Nanocrystal Size and Capping Ligands in the Collective Mechanical Response of Three-Dimensional Nanocrystal Solids. *J. Am. Chem. Soc.* **2010**, 132, 8953–8960.



Nanomaterials for application in batteries and catalysis



20. Soon Gu Kwon, Galyna Krylova, Aslihan Sumer, Michael M. Schwartz, Emilio E. Bunel, Christopher L. Marshall, Soma Chattopadhyay, Byeongdu Lee, Julius Jellinek, and **Elena V. Shevchenko**. Capping Ligands as Selectivity Switchers in Hydrogenation Reactions. *Nano Lett.*, **2012**, 2, 5382–5388.
21. Bonil Koo, Hui Xiong, Michael D. Slater, Vitali B. Prakapenka, Mahalingam Balasubramanian, Paul Podsiadlo, Christopher S. Johnson, Tijana Rajh, and **Elena V. Shevchenko**. Hollow Iron Oxide Nanoparticles for Application in Lithium Ion Batteries. *Nano Lett.*, **2012**, 12, 2429–2435.
22. Bonil Koo, Soma Chattopadhyay, Tomohiro Shibata, Vitali B. Prakapenka, Christopher



S. Johnson, Tijana Rajh, and Elena V. **Shevchenko**. Intercalation of Sodium Ions into Hollow Iron Oxide Nanoparticles. *Chem. Mater.*, **2013**, 25, 245–252.

23. Bonil Koo, Pradyumna Goli, Anirudha V. Sumant, Paula Cecilia dos Santos Claro, Tijana Rajh, Christopher S. Johnson, Alexander A. Balandin, and **Elena V. Shevchenko**. Toward Lithium Ion Batteries with Enhanced Thermal Conductivity. *ACS Nano*, **2014**, 8, 7202–7207.

Review articles

24. D.V. Talapin, J.-S.. Lee, M. Kovalenko, E.V. Shevchenko. Prospects of colloidal nanocrystals for electronic and optoelectronic applications. *Chem. Rev.* 2010, 110, 389-458.

25. A.L. Rogach, D.V. Talapin, E.V. Shevchenko, A. Kornowski, H. Weller. Organisation of Matter on Different Size Scales: Monodisperse Nanocrystals and their Superstructures. *Adv. Func. Mater.* 2002, 12, 653-664.